IN THE U.S.PATENT AND TRADEMARK OFFICE

Applicant: SAMBARK CO., LTD.
Serial No.: 10/599,523 Art Unit: 1787
Filed: September 29, 2006 Examiners: Frank D. Ducheneaux, and Alicia Chevalier
For: Thermoplastic compound plate-shaped material, method for manufacturing and articles manufactured using the same

DECLARATION UNDER 37 C.F.R. SECTION 1.132

Honorable Commissioner of
Patent and Trademarks
Washington, D.C. 20231

I, Sang Jun Youn, a citizen of Korea, residing at Chungcheonnam-do, Korea, hereby declares as follows:

1. I am an inventor of the subject matter of the above identified application.

2. My personal particulars are summarized as follows:

[Specialty]

Bachelor of Science, specialty on chemistry, INHA UNIVERSITY (1990)
Master of Science, specialty on Organic chemistry, INHA UNIVERSITY (1992)

[Worked for]

R&D Center, Daelim Industial co., LTD (Petrolium & Polymer Supplyer), Senior Researcher (1992. 1. - 2003. 2.)

Polymer Hybrid center, Korea Institute of Science and Technology (KIST), Senior Researcher (2003. 8. - 2004. 7.)

R&D Center, EPIA (EPP, Expended Polypropylene, supplyer), R&D director (2007. 1. - 2008. 12.)

Sambark co., LTD., managing director (2003. 4. - present)

[Activities]

ISO TC138/ SC1, SC2, SC3, SC4 committee, Korean delegator (1999 - 2006)
ISO TC61 committee, Korean delegator (2006 - present)
A boarding member of judgment panel for government funding program

[Prize]

2010 New technology awards presented by Korean government (NET)
2011 IR JangYongSil Awards presented by Korean government (NET)

[Paper]

1. The absence of temperature effect in the competitive beta-cleavages of benzyl methyl substituted-benzyl carbonyl oxy radicals, Journal of American Chemical Society, 1994. 116

2. The absence of temperature effect in the competitive beta-cleavages of benzyl methyl substituted-benzyl carbonyl oxy radicals, Tetra Headron Letter 1991.7,32 (36)

[Patent]

1. Decomposable Resin Composition (KR Patent No. 10-0198199)

2. Photo-Degradable Polyolefin Film Composition (KR Patent No. 10-0107031)

3. A Thermoplastic Polymer Composite Panel for the Replaced Using of Plywood (KR Patent No. 10-0219734)

4. A Polymer Panel and a Device Manufacturing the Same (KR Patent No. 10-0276359)

5. Foamed Sewer Pipe (KR Patent No. 10-0449158)

6. Thermoplastic pipe having better hardness and weldingproperty, die for extruding the same, and method forpreparing the same (KR Patent Application No. 10-2001-0036548)

7. Sewer Pipe (KR Patent No. 10-0449157)

8. Pipes (KR Patent No. 10-0603812)

9. Articles manufactured using thermoplastic compound plate-shaped material (KR Patent No. 10-0814861)

10. Thermoplastic compound plate-shaped material, method for manufacturing the same (KR Patent No. 10-0814860)

11. Thermoplastic compound plate-shaped material, method for manufacturing the same (US Patent Application No, 10/599,523)

12. Panel for formwork made by thermoplastic compoundmateria (KR Patent No. 10-1054954)

13. Thermoplastic Compound Panel, Apparatus and Method for Manufacturing the Same (KR Patent Application No. 10-2009-0084867)

14. Thermoplastic Compound Panel, Apparatus and Method for Manufacturing the Same (PCT Application No. PCT/KR2010/005969)

15. Bumper System (KR Patent Application No. 10-0814862)

16. Thermal conductive resin and LED heat sink, LED lighting case and SMPS case comprising same (KR Patent Application No. 10-2009-0061116)

17. Foaming Method and Apparatus of Long-Fiber Reinforced Thermoplastics (KR Patent No. 10-0927193)

18. Molding Method of Bumper Back Beam for Vehicle (KR Patent No. 10-0941096)

19. Forming Apparatus and Method of Fiber Reinforced Thermoplastic Composite Material and Product Using the Same (KR Patent Application No. 10-2009-0084377)

20. Die for Extrusion Molding (KR Patent Application No. 10-2011-0007930)

21. Forming System and Method of Fiber Reinforced Thermoplastic Composite Material (KR Patent Application No. 10-2011-0013355)

3. I am thoroughly familiar with the Office Action dated April 11, 2011, wherein claims 1, 5, 7 and 10 of the present application have been rejected under 35 U.S.C. 103(a) as being unpatentable over Sakai et al. (US 5,294,394) in view of Hsiao et al. (US 2002/0009935 A1).

In the Office Action, the Examiner concluded that absent evidence of criticality regarding the presently claimed process and given that Sakai and Hsiao meet the requirements of the claimed continuous reinforcing fiber-impregnated prepreg layer, Sakai and Hsiao clearly meet the requirements of the present claims. In this regard, I have conducted the comparative experiments between the prepreg layers of the present invention and Sakai/Hsiao.

4. Under my direction and control, the comparative experiments were conducted for determining that the prepreg layer of the present invention has a superior effect to those of Sakai and Hsiao in Sheet impact crack initiation energy, Sheet impact energy, Bending elastic modulus, and Bending strength.

(1) Preparation of prepreg layers

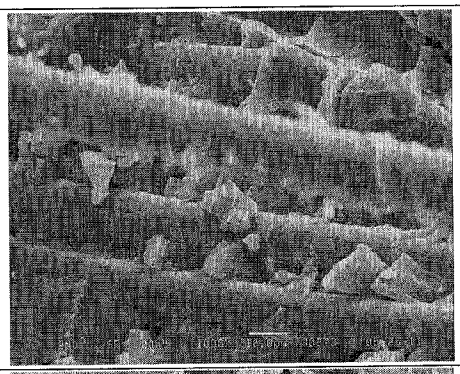
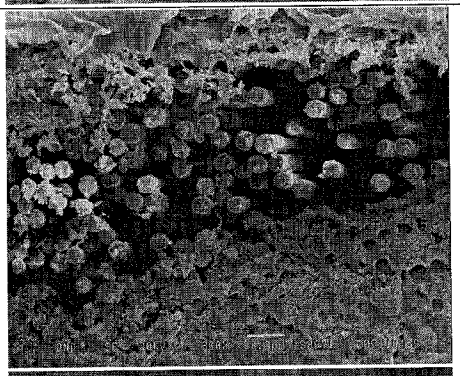
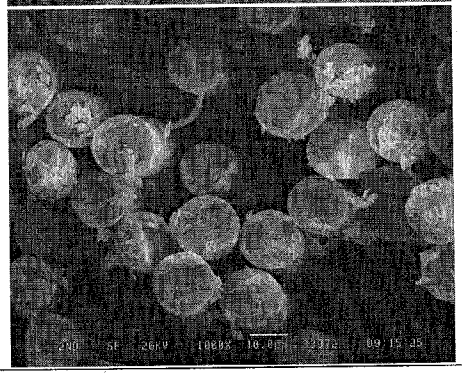
In accordance with the paragraph [0047] of the present application, the prepreg layer of the present invention were prepared. The density was 1.2 g/cc, and the content of glass fibers was 40 wt%.

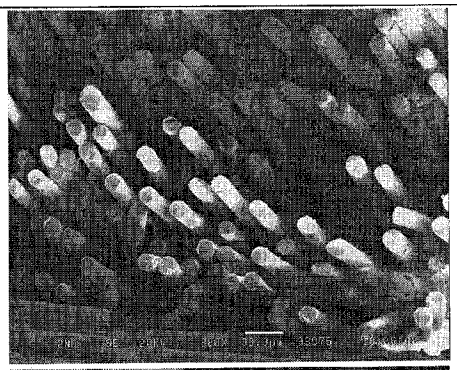
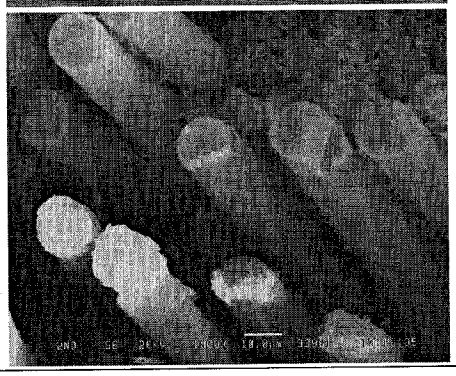
In accordance with the description of column 6, line 63 to column 7, line 5 of Sakai, the prepreg layer of Sakai were prepared by 120 glass yarns obtained by collecting about 1600 monofilaments of about 11 μm in size, were paralleled to a width of 230 mm under uniform tension, brought into contact with polypropylene, and impregnated with polypropylene by press such that 40 wt% of the glass fiber is contained for correct comparison with the present invention. The glass yarns were purchased from 'Textile yarn' of Hankook Fiber Co., Ltd.

In accordance with paragraphs [0110-0111] of Hsiao, the prepreg layer of Hsiao were prepared by that fabric, in which glass fibers obtained by collecting about 2400 monofilaments of about 17 μm in size were weaved in warp and weft, were brought into contact with polypropylene, and impregnated with polypropylene by press such that 40 wt% of the glass fiber is contained for correct comparison with the present invention. The fabric was purchased from 'Roving cloth' of Hankook Fiber Co., Ltd.

The glass fiber contents, density, and SEM images of the prepreg layers prepared by the above are shown in the following Table 1:

[Table 1]

	Glass fiber content (wt%)	Density (g/cc)	SEM image
The present invention	40	1.2	 (×1000)
Sakai	40	1.2	 (×300)  (×1000)

Hsiao	40	1.2	 (×300)  (×1000)

(2) Test Method

The prepreg layers prepared by the above were measured for Sheet impact crack initiation energy, Sheet impact energy, Bending elastic modulus, and Bending strength in accordance with paragraph [0047] and Table 2 of the present application. Specifically, Sheet impact crack initiation energy and Sheet impact energy were measured in condition of speed of 10.3 m/sec and impact energy of 167 J, and Bending elastic modulus and Bending strength were measured according to ASTM D790.

(3) Test Results

1) In SEM images, it was observed that the surface of glass fiber of the prepregs of Sakai and Hsiao is smooth, which means that the polypropylene was not impregnated sufficiently. However, it was observed that the surface of glass fiber of the prepregs of the present invention is rough, which means that the polypropylene was impregnated sufficiently.

2) The results of the comparative experiments in Sheet impact crack initiation energy, Sheet impact energy, Bending elastic modulus, and Bending strength are shown in the following Table 2:

[Table 2]

	Glass fiber Content (wt%)	Density (g/cc)	Impact Crack initiation energy (J)	Impact Crack total energy (J)	Bending modulus (kgf/cm^2)	Bending strength (kgf/cm^2)
The present invention	40	1.2	26	43	111,400	2720
Sakai	40	1.2	14	23	106,000	2470
Hsiao	40	1.2	22	36	82,000	1640

As shown in Table 2, the prepreg layer of the present invention has a superior effect to those of Sakai and Hsiao in Sheet impact crack initiation energy, Sheet impact energy, Bending elastic modulus, and Bending strength even though the glass fiber contents and density is the same.

5. Conclusion

1) The prepreg layers of Sakai and Hsiao were prepared by impregnating the thermoplastic resin after a glass fiber mat was prepared. The glass fiber mat is already prepared before the impregnating of the thermoplastic resin, so the thermoplastic resin could not be impregnated into the glass fiber mat. This is also observed in SEM images in the above Table 1. However, the prepreg layer of the present invention was prepared by each of the plurality of tapes or strands of the prepreg layer that have been impregnated with a thermoplastic resin prior to being aligned. By this method, the resin is able to be fully impregnated into the fiber, and this is also observed in SEM images in the above Table 1.

2) The impregnation of the thermoplastic resin into the glass fiber has a strong influence on the mechanical properties of the prepreg layer. According to the above Table 2, it is shown that the prepreg layer of the present invention has a superior effect to those of Sakai and Hsiao.

3) From the fact that the glass fiber contents and density of the prepreg layer of the present invention are the same as those of Sakai and Hsiao, I believe that the superior effect is the result of the differences in the preparation process. Therefore, I believe that a non-obvious difference between the claimed product and Sakai/Hsiao is proved, and thus the present invention has an inventive step over Sakai and Hsiao.

6. I hereby declare that all statements made herein are to my own knowledge and that these statements are made on the best information believed to be true; that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patents issuing thereon.

Dated: 20th day of September 2011

Signature: Sang Jun Youn

Sang Jun Youn